RUST GEOTECH INC.

Spectral Gamma-Ray Borehole
Log Data Report

Log Event A

Borehole # 52-04-02

Borehole Information

Farm : TY	**Tank :** TY-104	**Site Number :** 299-W10-97
N-Coord : 42,536	**W-Coord :** 75,920	**TOC Elevation :** 670.56
Water Level, ft :	**Date Drilled :** 12/31/1971	

Casing Record

Type : Steel-welded	Thickness : 0.280	ID, in. : 6
Top Depth, ft. : 0	Bottom Depth, ft. : 98	

Borehole Notes:
This borehole was drilled in December 1971 to a depth of 100 ft. The borehole was started with a 22-ft length of surface casing of unknown diameter and completed to a depth of 100 ft with 6-in.-nominal-diameter carbon-steel casing. The driller's log does not indicate the disposition of the surface casing but it was probably removed. The annulus was probably not grouted because this procedure was not a standard practice at the time the borehole was drilled. There is no indication that the casing was perforated.

The casing thickness is presumed to be 0.280 in., on the basis of published thickness for schedule-40, 6-in. steel tubing.

The top of the casing, which is the zero reference for the SGLS, is contained within a concrete collar that is approximately even with the tank farm surface and with the collars of other boreholes in the vicinity.

Equipment Information

Logging System : 1	**Detector Type :** HPGe	**Detector Efficiency:** 35.0 %
Calibration Date : 04/1996	**Calibration Reference :** GJPO-HAN-5	**Logging Procedure :** P-GJPO-1783

Log Run Information

Log Run Number : 1	**Log Run Date :** 5/9/1996	**Logging Engineer:** Mike Widdop
Start Depth, ft.: 98.0	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 23.5	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

Log Run Number : 2	**Log Run Date :** 5/10/1996	**Logging Engineer:** Mike Widdop
Start Depth, ft.: 24.5	**Counting Time, sec.:** 100	**L/R :** L **Shield :** N
Finish Depth, ft. : 0.0	**MSA Interval, ft. :** 0.5	**Log Speed, ft/min.:** n/a

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Analysis Information

Analyst : H.D. Mac Lean

Data Processing Reference : P-GJPO-1787 Analysis Date : 2/6/1997

Analysis Notes :

This borehole was logged in two logging runs. The field verification specra acquired during the pre-survey system check conducted immediately before both logging runs failed to meet the acceptance criteria established for the peak shape and system efficiency. A nonconformance report issued in August 1996 (N-96-05) identified the cause of this failure as a power supply malfunction that resulted in a low detector bias voltage being supplied to the logging tool. This malfunction occurred in the mornings during start-up of the cold system because an extra long system warm-up time was required to bring the system to its optimal operating condition. The nonconformance report also documents that radionuclide concentrations calculated from data collected in the first 2 hours of the logging operation could be systematically understated by about 10 percent. Data from the second run (0 to 24 ft) may show a slight discrepancy in repeatability if the borehole is re-logged in the future.

The post-survey field verification spectra for both logging runs passed the acceptance criteria for the peak shape and system efficiency, indicating that the logging system was operating within specifications after an extended warm-up period. The energy calibration and peak-shape calibration from the field verification spectra that most closely matched the energy distribution on the logging spectra were used to establish the channel-to-energy parameters used in processing the spectra acquired during logging. Because of system drift related to the detector voltage problem, it was necessary to transfer the energy calibration and peak-shape calibration from the pre-survey verification spectra to some of the logging spectra acquired during the initial portion of the second logging run. Slight gain drift was experienced over brief intervals during both logging runs. To maintain proper peak identification, it was necessary to compensate for this drift by adjusting the energy calibration of a few of the logging spectra acquired during logging operations.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The only man-made radionuclide detected in this borehole was Cs-137. The contaminant was detected in the upper 1 ft of the borehole, intermittently between 7.5 and 24 ft, and at 89, 91.5, and 97.5 ft with concentrations just above the MDL at about 0.15 pCi/g. The maximum Cs-137 concentration was 0.37 pCi/g at the ground surface. All measured concentrations below a depth of 7.5 ft were less than 0.2 pCi/g.

The K-40 concentration values increase from a background of about 12 pCi/g above the 46-ft depth to about 18 pCi/g below this depth. The measured Th-232 and U-238 concentrations increase perceptibly below a depth of about 93 ft.

Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank TY-104.

Log Plot Notes:

Separate log plots show the concentrations of the man-made radionuclide (Cs-137) and the naturally occurring radionuclides (KUT). The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations.

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Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, in addition to the total gamma derived from the spectral data and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.